

Domestic Uses and Safety

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.2 Electricity
Sub-Topic	Domestic Uses and Safety
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: 56 minutes

Score: /54

Percentage: /100

Grade Boundaries:

Q1. Most electrical appliances are connected to the mains electricity using three-core cables.

- (a) What is the approximate value of the potential difference of the UK mains electricity supply?

Tick **one** box.

23 V

☐

230 V

☐

300 V

☐

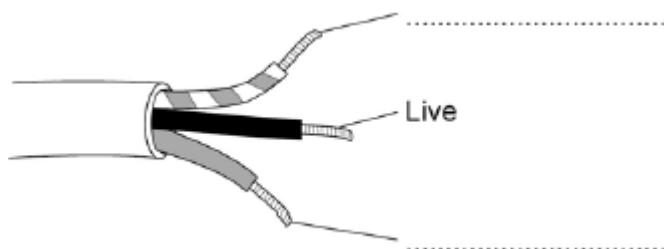
350 V

☐

(1)

- (b) **Figure 1** shows a three-core cable.

Figure 1



Use answers from the box to label the wires and complete **Figure 1**.

Earth	Negative	Neutral
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(2)

- (c) In the UK the three wires in a three-core cable are always the same colours.

Why are the wires always the same colours?

Tick **one** box.

Each wire is made by a different company.

☐

It is easy to identify each wire.

☐

They are cheaper to manufacture.

☐

(1)

- (d) Touching the live wire is dangerous.

Use answers from the box to complete the sentences.

current	resistance	shock	force	voltage
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Touching the live wire causes a large potential difference to exist across the body.

This causes a through the body, which results in an electric

(2)

- (e) What is the approximate frequency of the UK mains electricity supply?

Tick **one** answer.

50 Hz

☐

75 Hz

☐

100 Hz

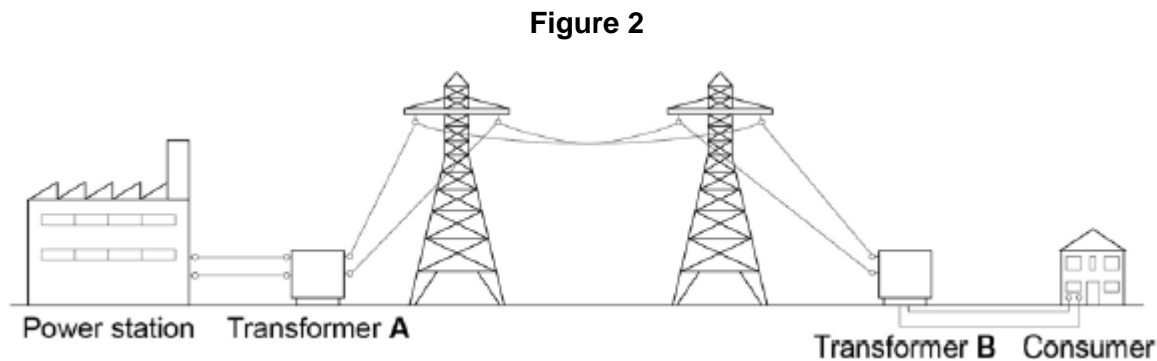
☐

150 Hz

☐

(1)

- (f) **Figure 2** shows how power stations transfer electrical power to consumers using the National Grid.



The power station generates electricity at a voltage of 25 kV.

Transformer **A** increases the voltage by a factor of 16.

What is the voltage output of transformer **A**?

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.....

.....

Output voltage = kV

(2)

- (g) Why is the voltage increased by transformer **A**?

Tick **one** box.

To reduce the energy lost due to heating

☐

To increase the power

☐

To increase the current

☐

(1)

- (h) Why is it important that the voltage is decreased by transformer **B**?

Tick **one** box.

Less energy is used by consumers

☐

It is safer for consumers

☐

It reduces consumers' electricity bills

☐

(1)
(Total 11 marks)

Q2. We use mains electricity in our homes.

- (a) What is the frequency of the UK mains electricity supply?

Tick **one** box.

23 Hz

☐

50 Hz

☐

230 Hz

☐

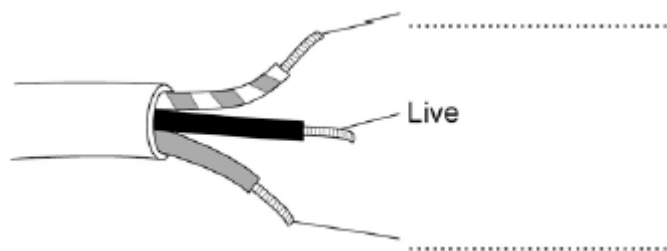
500 Hz

☐

(1)

- (b) Many appliances in the home use three-core electrical cable.

Look at the figure below.



Label the wires in the cable in the figure above.

Use words from the box.

Earth	Negative	Neutral	Positive
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(2)

- (c) The sentences explain how touching the live wire in a cable can cause an electric shock.

Complete the sentences.

Use words from the box.

current	force	resistance	potential difference
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Touching the live wire causes a large to exist across the body.

This causes a through the body, which results in an electric shock.

(2)

- (d) A heater has a power rating of 2500 W.

The heater is turned on for 180 seconds.

Calculate the energy transferred by the heater.

Use the equation:

$$\text{energy transferred} = \text{power} \times \text{time}$$

Give your answer in kilojoules (kJ).

.....
.....

.....
Energy transferred = kJ

(3)

- (e) Write down the equation that links charge flow, energy transferred and potential difference.

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(1)

- (f) The mains electricity supply is at 230 V.

A different heater transfers 4200 J of energy.

Calculate the charge flow through the heater.

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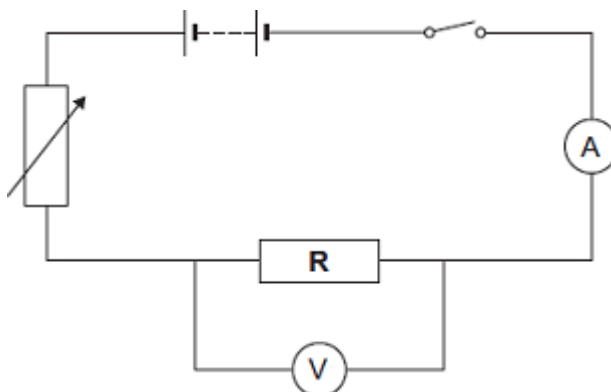
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Charge flow = C

(3)

(Total 12 marks)

- Q3.(a)** A resistor is a component that is used in an electric circuit.



- (i) Describe how a student would use the circuit to take the readings necessary to determine the resistance of resistor **R**.

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(6)

- (ii) Explain why the student should open the switch after each reading.

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.....

.....

(2)

- (iii) In an experiment using this circuit, an ammeter reading was 0.75 A.
The calculated value of the resistance of resistor **R** was 16 Ω .

What is the voltmeter reading?

.....

.....

Voltmeter reading = V

(2)

- (iv) The student told his teacher that the resistance of resistor **R** was $16\ \Omega$.

The teacher explained that the resistors used could only have one of the following values of resistance.

$10\ \Omega$ $12\ \Omega$ $15\ \Omega$ $18\ \Omega$ $22\ \Omega$

Suggest which of these resistors the student had used in his experiment.

Give a reason for your answer.

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(2)

- (b) The diagram shows a fuse.



Describe the action of the fuse in a circuit.

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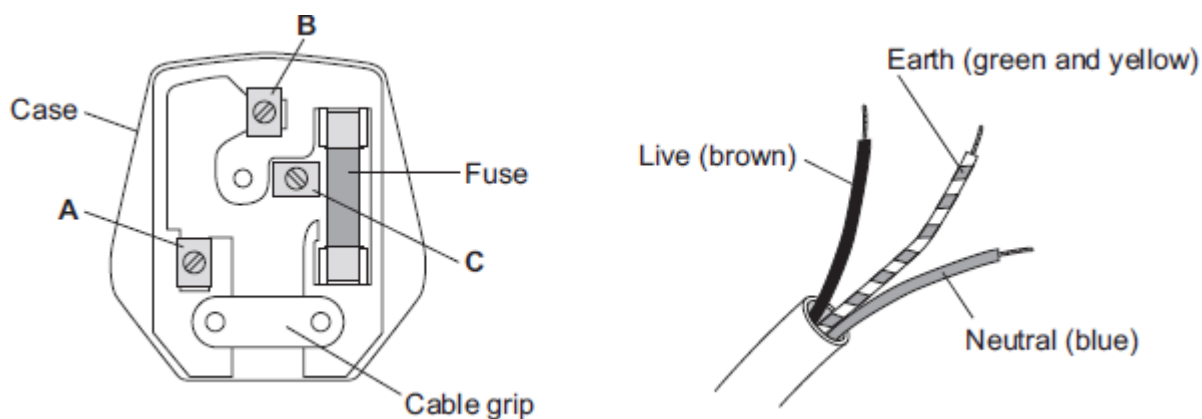
(3)

(Total 15 marks)

Q4.(a) **Figure 1** shows the inside of a three-pin plug and a length of three-core cable.

The cable is to be connected to the plug.

Figure 1



- (i) Complete **Table 1** to show which plug terminal, **A**, **B** or **C**, connects to each of the wires inside the cable.

Table 1

Wire	Plug terminal
Live	
Neutral	
Earth	

(2)

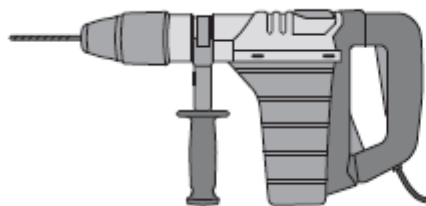
- (ii) Name a material that could be used to make the case of the plug.

.....

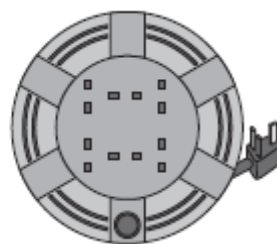
(1)

- (b) **Figure 2** shows an electric drill and an extension lead. The drill is used with the extension lead.

Figure 2



Electric drill



Extension lead

- (i) The drill is used for 50 seconds.

In this time, 30 000 joules of energy are transferred from the mains electricity supply to the drill.

Calculate the power of the drill.

.....
.....
.....

Power = W

(2)

- (ii) A second drill is used with the extension lead. The power of this drill is 1200 W.

The instructions for using the extension lead include the following information.

When in use the lead may get hot:

DO NOT go over the maximum power

- lead wound inside the case: 820 watts
- lead fully unwound outside the case: 3100 watts

It would **not** be safe to use this drill with the extension lead if the lead was left wound inside the plastic case.

Explain why.

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(3)

- (c) **Table 2** gives information about three different electric drills.

Table 2

Drill	Power input in watts	Power output in watts
X	640	500
Y	710	500
Z	800	500

A person is going to buy **one** of the drills, **X**, **Y** or **Z**. The drills cost the same to buy.

Use only the information in the table to decide which **one** of the drills, **X**, **Y** or **Z**, the person should buy.

Write your answer in the box.

Give a reason for your answer.

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(1)

(Total 9 marks)

- Q5.(a)** The diagram shows the information plate on an electric kettle. The kettle is plugged into the a.c. mains electricity supply.

230 V	2760 W
50 Hz	

Use the information from the plate to answer the following questions.

- (i) What is the frequency of the a.c. mains electricity supply?

.....

(1)

- (ii) What is the power of the electric kettle?

.....

(1)

- (b) To boil the water in the kettle, 2400 coulombs of charge pass through the heating element in 200 seconds.

Calculate the current flowing through the heating element and give the unit.

Choose the unit from the list below.

amps

volts

watts

.....

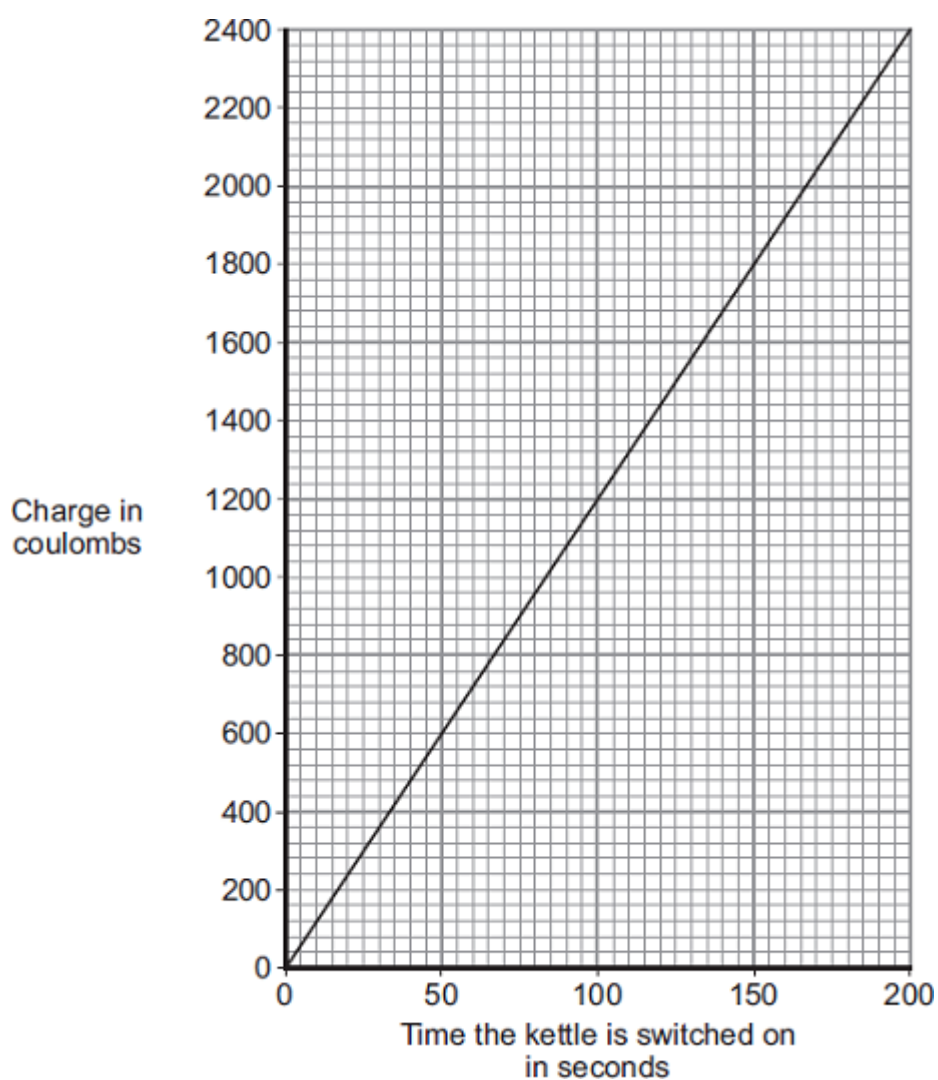
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Current =

(3)

- (c) The amount of charge passing through the heating element of an electric kettle depends on the time the kettle is switched on.



What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

.....
.....

(2)
(Total 7 marks)